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Hydrology Report

Pine Horse Valley Hazard Tree Removal

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Lake County, California

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Table of Contents

Hydrology Report

Proposed Actions

The 410,000 acre Ranch Fire greatly affected conditions on the Mendocino National Forest. Due to the fire, many trees are no longer alive and are at risk of falling; especially those along roadways. This project proposes to remove trees along roads which access private inholdings and other areas the public and/or National Forest employees need immediate access. Hazard tree removal is considered a form of road maintenance, required for safe travel by the public and for administrative uses. A 200-feet buffer on each side of the road will be used in order to compensate for at least one and a half tree heights of standing dead trees that have a chance of striking the roads when they fall. Total acreage of the project area is approximately 153,457 acres. However, because only areas around roads will have work done, **11,514** acres will be used as the analysis area (see figure 1) **3,690 acres of the analysis area have a commercial timber component**. Some of the work may be accomplished by salvage harvesting commercial trees that are hazards from fire-induced mortality or may have other characteristics that make them a threat to health and human safety. Hazard trees that are not able to be removed by commercial harvest will be either cut and left in place or cut and removed by other means (such as burning, mastication, or through a biomass burner). Road maintenance activities will include grading and cleaning of drainage features, such as ditches, waterbars or rolling dips.

The table below shows miles of proposed project per 6th field watershed, along with estimated acres for the 200' buffer per side of road.

Table 1. HTA in watersheds

Watershed HUC 12 Name	Watershed Acres	Commercial Acres	Fuels Treatment Acres
Bear Creek-Rice Fork	17224	336.2	845.6
Bucknell Creek	11665	1114.2	1363.9
Clover Creek	17660	69.5	453.8
Cold Creek- Eel River	36230	0.0	328.9
East Fork Middle Creek	12145	235.0	1180.1
French Creek-Rice Fork	17637	268.2	1284.9
Lake Pillsbury- Eel River	15917	0.0	413.9
Rice Creek-Rice Fork	26808	916.0	1886.2
Salt Flat Creek- Middle Creek	8993	0.0	629.2
Smokehouse Creek- Lake Pillsbury	25265	0.0	119.3
Soda Creek-Eel River	26810	512.3	640.4
Twin Valley Creek-North Fork Cache Creek	25604	21.0	1059.7
West Fork Middle Creek	11342	215.2	346.5

Analysis Area

The analysis area for cumulative watershed effects is all the 6th-Field watersheds that have project units in them (Figure 1). The 6th-Field is used because it is large enough to encompass adjacent activities and conditions that could add to cumulative watershed effects, but not so large that effects from this project become insignificant within the larger watershed.

Table 2. Watershed overview of Pine Horse Valley Roadside Hazard Tree Removal

HUC 12#	Watershed HUC 12 Name	Watershed Acres
180101030102	Bear Creek-Rice Fork	17224
180101030501	Bucknell Creek	11665
180201160203	Clover Creek	17660
180101030203	Cold Creek- Eel River	36230
180201160201	East Fork Middle Creek	12145
180101030101	French Creek-Rice Fork	17637
180101030205	Lake Pillsbury- Eel River	15917
180101030103	Rice Creek-Rice Fork	26808
180201160204	Salt Flat Creek- Middle Creek	8993
180101030204	Smokehouse Creek- Lake Pillsbury	25265
180101030502	Soda Creek-Eel River	26810
180201160402	Twin Valley Creek-North Fork Cache Creek	25604
180201160202	West Fork Middle Creek	11342

Affected Environment

The analysis area is primarily owned by the US Forest Service, with some small, private inholdings. There are no industrial timber lands and the Lakeview project is the only recent timber harvest project by the Forest Service. As such, the watersheds were in relatively good shape before the fires of 2018.

The majority of streams within the project area are low order (1-3) ephemeral and some intermittent streams often with gradients of 10% or higher and side slopes greater than 45%. Packsaddle Creek, Tributary to Packsaddle, and Benmore Creek are the only perennial streams within proposed units. These lower order streams support little to no phreatophytic vegetation. True riparian vegetation, where it exists, is limited to about five to ten feet from the channel. During field visits post fire in January and February 2019, very little (less than 10%) of riparian vegetation has recovered.

Three in-channel surveys in the Pine Mountain and Packsaddle area using the Region 5 Stream Condition Inventory (SCI) protocol (Frazier et al., 2005) have been established over the past few years. Attributes collected include: cross sections, particle counts, longitudinal profile, streambank stability, bank angles, shading, stream temperature, macroinvertebrates, basic water chemistry and large woody debris counts.

Locations of the SCI survey include: Benmore Creek, Packsaddle Creek, and Tributary to Bucknell Creek. All three creeks are classified as Rosgen B4 channels (Packsaddle is B4a for steeper slope). These channels are dominate in gravel material and are characterized as a series of rapids with irregular pools (Rosgen, 1996). These types of streams are considered relatively stable and are not a high sediment supply stream channel. They are also moderate in their sensitivity to disturbance and have excellent recovery potential (Rosgen, 2006). Survey details can be provided upon request. These reaches will also be resurveyed in 2019, post-Ranch Fire but pre-project.

Although the Ranch Fire of 2018 burned very hot in some areas, the majority of the fire burned at a moderate to low severity. A relatively small percentage of each watershed was burned at high soil burn severity. Also, the location of the most severe burn areas along ridgetops splits the effects into adjacent watersheds. Elevated erosion and sedimentation are expected for several years but negative effects should be ameliorated in time and space as this sediment makes its way downstream to valuable aquatic habitat.

Foreseeable Future Projects

Forseeable future projects for the analyzed watersheds include additional future fuels reduction projects, although there are no plans at this time. In the event additional projects within these watersheds are proposed, additional analysis will be completed for them.

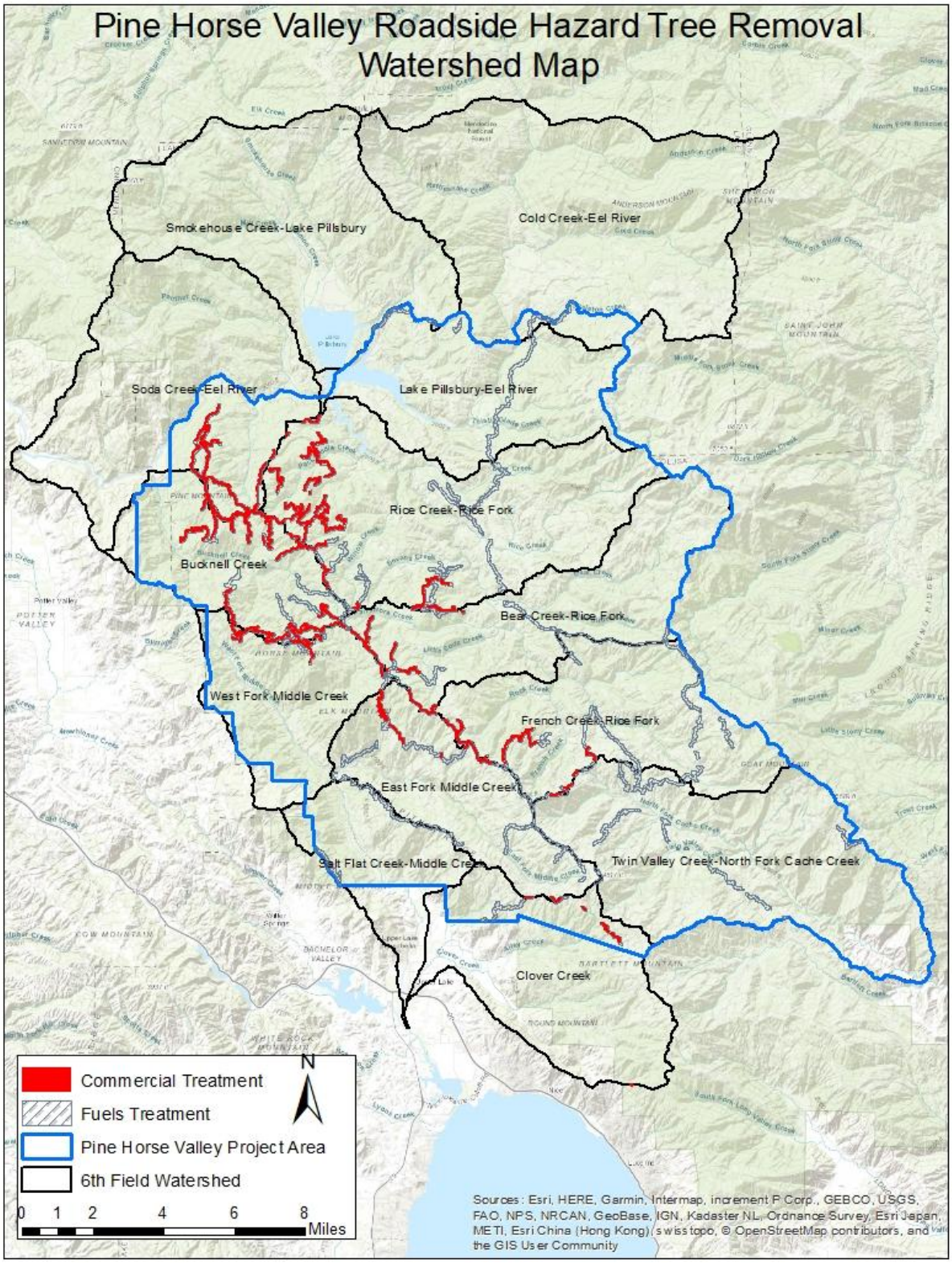


Figure 1. Map of 6th field watersheds and proposed project roads.

Environmental Consequences

Alternative 1 – No Action

Direct Effects and Indirect Effects

Direct and indirect effects associated with not treating the road areas would result in accumulation of forest material; eventually increasing the potential for another catastrophic fire. The lost opportunity to reduce fuel loading has the potential to affect riparian habitat and water quality. It has been documented that wildfires can produce accelerated erosion to the watershed (Shakesby et al. 1993; Benvaides-Solorio and MacDonalds, 2001). Though not related to watershed health, worker and public safety is also another important consideration if dead trees do not get removed along the road.

Cumulative Effects

The analysis of No Action Alternative is the same as the existing condition. Analysis of the No Action Alternative indicates that potential for cumulative effects is moderate, largely due to the 2018 Ranch Fire. Watersheds in the project area currently are below threshold with the exception of East Fork Middle Creek. (Table 4 and Cumulative Watershed Effects in the next section).

Alternative 2 – Proposed Action

Direct and Indirect Effects

The proposed action has the potential to temporarily affect aquatic resources through removal of vegetation, slash piling, and use of tracked equipment. The main concern with these actions are the disturbances to soil. Soil displacement, compaction, or decrease in ground cover could cause an effect on watershed condition and aquatic habitat. To meet soil cover standards, limbs and unmerchantable timber will be left within the unit, which will increase soil cover and decreased the potential for soil loss. Only trees that are completely dead (i.e., not one green needle) will be harvested, therefore there will be no canopy removal from the project itself. The suite of Best Management Practices (BMPs) and Design Features are designed to minimize soil displacement and transport off-site (see Project Design Features and Best Management Practices section of this report). The acres of treatment in each watershed are small at the 6th-field watershed scale. The highest proportion of treatment acres within a watershed is in the Bucknell Creek, in which Pine Horse Valley Roadside Hazard Tree Abatement units will occupy approximately 9% of the watershed (Table 1).

Cumulative Effects

Watershed effects as a result of the proposed action have been analyzed using the Cumulative Watershed Effect (CWE) process (as required by USDA FSH 2509.22, Soil and Water Conservation Handbook, Chapter 20- Cumulative Off-site Watershed Effects Analysis). This analysis considers all ground-disturbing activities (past, present, and reasonable foreseeable future) on and off of Forest Service lands. The analysis also considers soil burn severity of the 2018 Ranch Fire, as well as any known timber operations on private land as a result (Emergency Timber Harvest Plans).

Scores for the CWE analysis is based on the Equivalent Roaded Acres (ERA); one unit of ERA is equal to one acre of land that is completely roaded. In calculating ERA's, all ground disturbing activities are assigned an activity coefficient. This is due to the fact that most disturbances are a fraction of an ERA and have a recovery period. For example, a partial cut with a tracked skidder has an activity coefficient of 0.18 and recovery period of 10 years. Permanent disturbances that have little to no recovery (eg roads and landings) have a coefficient of 1.

Initial ERA= acres of activity * activity coefficient

For subsequent years, to account for recovery:

Projected ERA= Initial ERA * 0.5^ (recovery years/ recovery half-life)

A percent disturbance for the watershed is then calculated as the %ERA:

%ERA= ERA / watershed acres * 100

This %ERA value is compared to a pre-determined Threshold of Concern (TOC); and when the %ERA is greater than the TOC, further analysis is required to determine if water yield, erosion, or sedimentation are of concern. The TOC varies with soil erodibility, geologic stability, and drainage density. The formula used for calculating the TOC is:

[(Watershed Acreage) x (TOC Coefficient)]- (Active Landslide Acreage)

An assigned TOC coefficient for a watershed is based on the stream's stability; the more stable the stream is, the greater the TOC coefficient, which range from 0.08 to 0.16. If it is impractical to survey an affected stream to determine stability rating, then the watershed is assigned the lowest TOC coefficient of 0.08

Watersheds containing roadside hazard abatement and fuels treatment appear to be in relatively good shape, and do not pass the TOC, with the exception of East Fork Middle Creek. This watershed exceeds threshold by 0.15%. Further, a review of road density in the East Fork Middle Creek show the road/trail system at below 1%, well below the TOC for roads of a 2% ERA (USDA, MNF 2009).

Changes between the No Action TOC and Proposed Project TOC are not very large, indicating that this project will not lead to cumulative watershed effects. All watersheds will dropped well below TOC, by 2020, due to vegetation recovery (table 4). Erosion and sedimentation should be very similar to what they would be without this project. Since the canopy was already removed by the fire, and no live vegetation will be removed from riparian reserves, this project will have no effect on stream temperature. The use of Best Management Practices and project design features will help lessen or eliminate effects from the project.

Table 4. Cumulative Watershed Effects analysis for No Action and Proposed Action

Watershed	Watershed Acres	TOC ERAs Adjusted	No Action ERAs	Proposed Action ERAs	ERAs in 2020
Bear Creek-Rice Fork	17224	11.35	4.58	4.74	3.31
Bucknell Creek	11665	10.83	3.9	4.67	3.99
Clover Creek	17660	7.97	6.35	6.41	4.21
Cold Creek- Eel River	36230	8.00	2.76	2.78	2.14
East Fork Middle Creek	12145	10.51	10.96	*11.11*	7.84
French Creek-Rice Fork	17637	12.33	7.96	8.08	5.71
Lake Pillsbury- Eel River	15917	8.00	3.21	3.21	1.87
Rice Creek-Rice Fork	26808	10.71	2.68	2.95	2.34
Salt Flat Creek- Middle Creek	8993	8.00	4.76	4.97	4.97
Smokehouse Creek- Lake Pillsbury	25265	8.00	1.4	1.4	1.33
Soda Creek-Eel River	26810	5.74	1.5	1.66	1.57
Twin Valley Creek-North Fork Cache Creek	25604	11.60	7.37	7.38	4.48
West Fork Middle Creek	11342	11.00	5.35	5.51	3.75

Compliance with law, regulation, policy, and the Forest Plan

Compliance for this project include: Clean Water Act (1977), Executive Order 11988 (Floodplain Management, 1977), National Forest Management Act (1976), Mendocino National Forest Land and Resource Management Plan (1996), Porter- Cologne Water Quality Control Act (1999), Executive Order 11990 (Protection of Wetlands, 1977) . The following were excluded because they are not affected by the project or do not apply: Coastal Zone Management Act (1972; 16 USC 1451), Wild and Scenic Rivers (1508.27 (b)(3)).

Project Design Features and Best Management Practices

Forest management and associated road building in the steep rugged terrain of forested mountains has long been recognized as sources of non-point water quality pollution. Non-point pollution is not, by definition, controllable through conventional treatment means. It is controlled by containing the pollutant at its source, thereby precluding delivery to surface water. Sections 208 and 319 of the Federal Clean Water Act, as amended, acknowledge land treatment measures as being an effective means of controlling non-point sources of water pollution and emphasize their development.

The Forest Service have developed and documented non-point pollution control measures to National Forest System lands. These measures were termed “Best Management Practices” (BMPs) and are designed to accommodate site specific conditions. They are tailor-made to account for the complexity and physical and biological variability of the natural environment. The following BMP’s have been identified to address watershed management concerns. These BMPs come from the 2012 Forest Service publication “National Best Management Practices for

Water Quality Management on National Forest System Lands." The implementation monitoring is done after the project has been completed, but before the winter season. Effectiveness monitoring is then completed on year later to determine success of BMP implementation.

All work and hauling should be done outside of the rainy season when soils are dry and potential damage to roads are minimized.

Chem 5 and Road 10 (Chemical Handling and Disposal/ Equipment Refueling and Servicing)

Objective

Chem 5- Avoid of minimize water and soil contamination when transporting, storing, preparing, and mixing chemicals; cleaning equipment or disposing chemical containers.

Road 10- Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during refueling and servicing activities.

Application- Handling chemicals, chemical containers and equipment (including petroleum-based) can lead to contamination of surface water or groundwater if not done carefully. Spills, leaks, or wash water can contaminate soil and leech into groundwater. Residue left on containers or equipment can wash off during precipitation events and enter surface waters.

Containers should be inspected on a regular basis to ensure no leaks, and stored away from riparian reserves. Spill kits should be available in case of an accidental spill. All waste should be disposed of according to state, federal and local regulations.

Road 4 (Road Operations and Maintenance)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.

Application- Consideration is given to the potential water quality effects from road damage when oversize or overweight loads are driven over forest roads. Roads should be routinely inspected to ensure they are not being impacted by log trucks. Water all dirt roads to minimize dust.

Veg 2 (Erosion Prevention and Control)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.

Application- The process of erosion control has three basic phases; planning, implementation, and monitoring. During planning, areas subject to excessive erosion, detrimental soil damage and mass failure can be identified and avoided. Suitable erosion control measures are implemented while the maintenance of implemented measures will ensure their function and effectiveness over their expected design period.

The potential for accelerated erosion or other soil damage during or following mechanical treatments depends on climate, soil type, site conditions, and type of equipment and techniques used at the site. Erosion control measures are grouped into two general categories: structural measure to control and treat runoff and increase infiltration and nonstructural measures to increase ground cover.

Veg 3 (Aquatic Management Zone) (also Riparian Reserves and Streamside Management Zones)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in AMZ.

Application- Designation of an AMZ around and adjacent to waterbodies is a typical BMP to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Mechanical vegetation treatments are a tool that can be used within the AMZ to achieve a variety of resource-desired conditions and objectives when implemented with suitable measures to maintain riparian and aquatic ecosystem structure, function, and processes. Depending on site conditions and resource-desired conditions and objectives, mechanical vegetation treatments in AMZ could range from no activity or equipment exclusion to purposely using mechanical equipment to create desired disturbances or conditions. When treatments are to be used in AMZ, a variety of measures can be employed to avoid, minimize, or mitigate soil disturbance, damage to waterbody, loss of large woody debris recruitment, and shading, and impacts to floodplain function.

Veg 4 (Ground-Based Skidding and Yarding Operations)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.

Application- Ground-based yarding systems include an array of equipment from hoses, rubber-tired skidders, and bulldozers, to feller or bunchers, forwarders, and harvesters. Each method can compact soil and cause soil disturbance, though the amount of impact depends on the specific type of equipment used, the operator, unit design, and site conditions. Ground-based yarding systems can be designed and implanted to avoid, minimize, or mitigate potential adverse effects to soils, water quality, and riparian resources.

Veg 5 (Cable and Aerial Yarding Operations)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.

Application- Cable and aerial yarding systems partially or fully suspend logs off the ground when yarding logs to the landing. They include skyline cable, helicopter, and balloon systems that typically are used in steep, erodible, and unstable areas where ground-based systems should not operate. Soil disturbance and erosion risks from these systems are primarily confined to cable corridors and landings.

Veg 6 (Landings)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from construction and use of log landings.

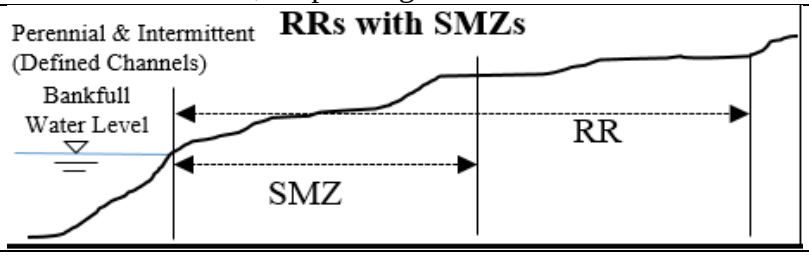
Application- Landings are generally sites of intense activity, with lots of equipment working in these concentrated areas. Chemicals and fuels are often stored at these locations to service equipment, leaving a high probability of soil compaction, overland flow, and soil contamination. Any chemical and fuel containers should be disposed of appropriately, in addition to any refuse (tires, chains, chokers, cables, and miscellaneous discarded parts). Contaminated soils should also be disposed appropriately. Provide ground cover where necessary to prevent erosion.

WatUse3 (Administrative Water Development)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when developing and operating water sources for Forest Service administrative and resource management purposes.
Application- Water source developments are needed to supply water for a variety of Forest Service administrative and resource management purposes, including dust control. Locations used for drafting should be preexisting locations, such as any of the boat ramps along Clear Lak, Lake Pillsbury or under the bridge of M1, below Scott Dam. Utilizing a high volume pump will help prevent water trucks from having to back down into water (which could have an effect of water quality if the truck has a leak).

BMP Checklist

This checklist was created as an easy way to ensure all BMP's are followed. BMP's have been characterized for applicability for pre, during, and post project. (check boxes for each stage, greyed out boxes do not apply to that stage)

Pre	During	Post	**Road 10- Equipment Refueling and Servicing/ Chem 5- Chemical Handling and Disposal**
			Allow refueling and servicing only at locations well away from water or riparian resources.
			Transport and handle chemical/fuel containers in a manner that prevents leaks and spills.
			Inspect, secure, and check containers regularly.
			Store any chemicals, including fuels, outside of Riparian Areas. Install contour berms and trenches around vehicle service and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills if necessary.
			Have spill kit or containment device on hand.
			Dispose of containers and contaminated soils appropriately from NFS lands.
			Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules and regulations.
Road 4- Road Operations and Maintenance			

			Water all dirt roads used for hauling.
			Inspect roads/haul routes frequently to ensure roads are not being impacted by log trucks.
			Restrict use or modify route if road is being damaged, such as unacceptable surface displacement or rutting.
			Roads used for hauling will be graded.
Veg 2- Erosion Prevention and Control			
			No ground-based mechanical equipment entry into unstable areas (unstable riparian reserves), such as active landslides and inner gorges. Inner gorges are 65% and above slopes immediately adjacent to stream beds. They extend up slope until a slope break where slopes are less than 65% or at ridge top.
			Leave felled hazard trees if fuels density meets objectives.
			All water control features (especially on roads) must be repaired and in working condition post-haul or prior to big storms.
			Use existing landings where possible. New landing construction should follow Veg 6 practices.
			No ground equipment on road cuts/road fills over 25% slope.
Veg 3- Aquatic Management Zones (Riparian Reserves and Streamside Management Zones, RRs and SMZs)			
			Retain all riparian-associated vegetation within the SMZs and RRs of seeps, springs, and unstable areas.
			Crossings of streams must be approved by the district hydrologist or fish biologist.
			Tractor piling is not permitted within RRs or SMZs.
			Cover bare soil areas that exceed 50 sq ft with mulch or slash if the area is likely to deliver sediment to a stream.
			For RRs: On slopes <50%, retain at least 50% ground cover (litter, duff, rocks) evenly distributed across the treatment area. For slopes >50%, retain at least 70% ground cover.
			SMZs have been identified and marked in the field with blue/white stripe flagging (also Fig.1).
			For SMZs: Retain at least 70% ground cover (litter, duff, rocks) evenly distributed across the treatment area.
			For SMZ: <u>No ground-based mechanized equipment will be allowed in SMZ</u>.
			For SMZ: Trees cut in the SMZ must be felled toward the RR. If it is necessary to remove the tree, it should be end lined or grapple skidded from outside of the SMZ, suspending one end where feasible.
			

			RR and SMZ width for each streamclass: (*Numbers are for EACH side)
			Streamclass / Riparian Reserve Buffer / Streamside Management Zone Buffer
			Perennial / 300 feet / The greater of 100' slope distance or to the slope break.
			Intermittent / 150 feet / The greater of 50' slope distance or to the slope break
			Ephemeral / 100 feet / 20', 50' for watersheds draining into Eel
			Veg 4- Ground-Based Skidding and Yarding Operations
			Prohibit equipment in designated SMZ's. Material may be removed from this zone however heavy equipment is excluded and would require review and approval by District or Forest Hydrologist for entry.
			In **Riparian Reserves**, fell only trees deemed a hazard according to the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region. When felling trees, retain the highest stump possible.
			Mechanical operations should occur during dry soil conditions; typically May 15-October 15. Operating during these times will minimize impact and reduce the potential for increased erosion.
			Ground-based heavy equipment will be limited to stable slopes less than 35%. Occasional use on stable slopes up to 40% for a distance not to exceed 100 feet is acceptable.
			Retain at least 50% ground cover (litter/duff/rock) across **all treatment areas**. Retention and even distribution of fine vegetation (rather than rocks) should be favored for ground cover and nutrient cycling.
			Fall merchantable trees perpendicular to roads to minimize the skidding lengths.
			Align non merchantable hazards trees along the contour to create erosion control, if possible, given safety considerations.
			Preference for utilizing tracked feller bunchers.
			Maintain ALL live or possible re-spurouting vegetation for stability.
			Any soil displacement caused by the mechanical equipment greater than 4 inches in depth would be back bladed or water-barred to prevent water concentration.
			Remove any material resulting from project activities causing obstruction of stormflows, (immediately upstream of culverts).
			Ensure recognition and protection of areas related to water quality protection delineation on Sale Area Maps. The sale administrator and purchaser will review these areas on the ground prior to commencement of ground disturbing activities. Examples of water quality protection features that will be designated on the project map include: 1) Location of streamcourses and riparian reserves to be protected 2) Wetlands (meadows, lakes, springs, etc.) to be protected. 3) Unstable areas to be protected.
			Veg 5- Cable and Aerial Yarding Operations
			Locate cable corridors to efficiently yard materials with the least soil damage.

			No yarding across stream corridor (unless the logs are fully suspended).
			Postpone yarding operations when soil moisture levels are high that it would result in unacceptable soil disturbance.
			Whole tree yard when possible.
			Provide ground cover where needed.
			At least one end of the log should be suspended whenever possible.
Veg 6- Landings			
			Remove all logging machinery refuse (tires, chains, chokers, cables, and miscellaneous discarded parts).
			Install any suitable drainage features to prevent erosion.
			Provide ground cover where needed.
Water Use 3- Administrative Water Developments			
			Water will not be drafted from anadromous streams (such as Eel River, Benmore Creek and Bucknell Creek)
			Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows.
			Draft from existing locations/ramps to Lake Pillsbury
			Follow Road 10/Chem 5 to prevent contamination of fuels and chemicals into waterways.
			Water-drafting vehicles shall contain petroleum spill kits. Dispose of absorbent pads accordingly.
			Utilize fish screen when drafting water

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Appendix A- Compliance Check with LRMP

Standards and Guides

The following checklist covers the LRMP Standards and Guides with which projects and activities must comply regarding the resources normally evaluated by the hydrologist. Information is provided regarding project design elements and resource conditions which affect the project's or activity's compliance with the Standards and Guides.

Watershed & Water Quality (Pages IV - 40, 41)		
S&G #	**Requirement**	**Project Compliance**
1a.	Within all watersheds, identify depleted watershed areas during the project	Watersheds that were hardest hit from the 2018 Ranch Fire are apparent in the CWE analysis (those

	environmental assessment process. Incorporate improvement activities as a part of the project.	showed larger ERA's % used). This project will help alleviate some of these same effects in the future by reducing fuel loads, and therefore reduce effects of future wildfires.
1c.	Within all watersheds, analyze projects that propose land disturbing activities for their effects on the appropriate level of watershed (normally second to fourth order watersheds) in order to prevent excessive cumulative watershed effects on stream channel condition and water quality. Cumulative watershed effects (CWE) analysis will be used to gauge impacts of past, present, and proposed management activities on a watershed.	CWE's were analyzed according to the ERA methodology (which includes past, present, and proposed activities). Cumulative activities within 6th field watersheds remain below Threshold of Concern.
1d.	Within all watersheds, implement Best Management Practices (BMP) to meet water quality objectives and maintain and improve the quality of surface water on the Forest. Identify methods and techniques for applying the BMPs during project level environmental analysis and incorporate them into the associated project plan and implementation documents.	BMPs prescribed in the Project Design Features and Best Management Practices of the Hydrology report are based on field review of the project.
Riparian and Aquatic Ecosystems Pages (IV 30-33)		
1a.	Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.	The Proposed Action will help achieve these values and objectives by reducing fuels and returning fire to areas where fire has been suppressed.
1b.	Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.	This project is not anticipated to have a negative effect on spatial or temporal connectivity between watersheds. The Proposed Action will have limited activities within Riparian Reserves while no mechanized equipment would be allowed within Streamside Management Zones.

1c.	Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	There are no anticipated negative effects to these values by the Proposed Action. Heavy equipment would be buffered from streams during thinning. Any crossing would have to be approved by a hydrologist or fisheries biologist. Crossings used would have to be repaired.
1d.	Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	Activities from the Proposed Action will not have a negative effect on water quality. Heavy equipment would be buffered from streams and leaving of slash and unmerchantable material will improve ground cover.
1e.	Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.	There are no activities that are anticipated to negatively affect the sediment regime. Heavy equipment would be buffered from streams. Roads would be regraded and maintained during or after implementation of the project.
1h.	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.	These values would be maintained and/or restored. The work would not take the RR vegetation outside the natural range, but rather help reduce (and prevent) future wildfire effects. The Proposed Action will help achieve these values and objectives by reducing fuels. Alternative 1 "No Action" would fail to yield these benefits.
1i.	Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	The purpose of this project will maintain the limited true riparian habitat within the project boundaries and help protect it from future wildfire.
3b.(2)	In Riparian Reserves, do not use mitigation or planned restoration as a substitute for preventing habitat degradation.	Mitigation is not being substituted for prevention of habitat degradation; there are no proposed actions to degrade habitat in Riparian Reserves.